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Osteoporosis Screening and Treatment: A Collaborative Approach

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A B S T R A C T

Osteoporosis and poor bone health effects approximately 200 million people worldwide, with numbers expected to increase as the population ages. Increases in osteoporosis and poor bone health are associated with increased fragility fracture rates, increased morbidity and mortality, and a huge economic burden. Osteoporosis screening and treatment guideline recommendations are currently underutilized resulting in a public health concern. This article describes current osteoporosis screening recommendations, pharmacological interventions, and a collaborative approach to treatment.

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More than half of all individuals older than the age of 50 are affected by poor bone health, osteopenia and/or osteoporosis, and the prevalence is expected to rise for many years. Fragility fracture rates along with their inherent morbidity and mortality are likewise predicted to rise.[1-3] Despite the rising number of people affected and the availability of practice guidelines, bone health screening and promotion are dwindling. This article illuminates how primary care practitioners can collaborate with bone health specialists to promote optimal bone health.

Background

Osteoporosis is the most common human bone disease.[4] An estimated 10.2 million Americans are living with osteoporosis and 43.4 million more Americans have low bone density, which accounts for 54% of the over-age-50 population. The US prevalence of osteoporosis and osteopenia combined is 35.5 million in women and 18.2 million in men. Osteoporosis and osteoporotic fragility fractures are a growing concern worldwide and are expected to increase with the aging population,[1] with an estimated increase of 10.4 million (19%) by 2020 and 17.2 million (32%) by 2030.[2] Approximately 50% of Caucasian females and 20% of males will experience an osteoporotic-related fracture of the hip, wrist, or spine in their lifetime.[4,5] Although the number of men with osteoporosis is lower than the number of women with the disease, the incidence of fractures in males with osteoporosis is higher than the risk of fracture in women with osteoporosis,[6] at least partially owing to gender inequalities in testing and treatment.[7]

Mortality following hip fracture is 2.8 to 4.0 times greater in the first 3 months postfracture than in similarly aged individuals without a hip fracture. Hip fracture survivors often experience a downward spiral in physical and mental health. After a hip fracture, 80% of patients are unable to perform basic tasks, 64% require a stay in a nursing home, and 20% will remain in a nursing home for the remainder of their life. In patients with hip fractures, 40% never regain their prefracture level of function.[4,8] Many experience isolation, depression, and fear of falls with subsequent fractures. These mental health issues often elevate to the point of incapacitation.[4,8] Hip fractures create a huge economic burden as well. More than $20 billion in health care is spent on osteoporosis-related hip fractures annually.[6]

Osteoporosis and fragility fracture screening rates remain suboptimal, even with expanded screening guidelines. An analysis of medical claims for more than 1 million women aged 50 or greater with no prior history of osteoporosis or hip fracture demonstrated screening rates of 12.8%–26.5%, with the highest rates associated with patients aged 65–79. Between 2008 and 2014, screening rates declined 34.1% for women aged 50–64, reflecting an underutilization of guideline recommendations for osteoporosis screening.[9] The International Osteoporosis Foundation (2014) estimates a huge screening gap; 80% of fragility fracture patients are not screened for osteoporosis.[8] Failure to screen fragility fracture patients results in a failure to provide safe, timely, and effective care. The increased risk for fragility fracture with age, combined with the growing older population and failure to screen for osteoporosis, highlights the potential for increased incidences of fragility fractures.[3,10,11]

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Screening and Diagnosis

The diagnosis and decision to treat osteoporosis is derived from multiple factors. As primary care providers (PCPs), nurse practitioners (NPs) are tasked with screening for many diseases, including osteoporosis. It is important for the NP to understand osteoporosis can occur in patients other than the traditionally targeted postmenopausal female population and to be aware of when it is appropriate to refer a patient to be evaluated for osteoporosis.

Recommendations to screen women over age 65 and men over age 70 for osteoporosis/osteopenia are widely known.[5,12,13] The National Osteoporosis Foundation (NOF) guideline recommends screening men and women age 50 and older who are affected by 1 of the 90 predisposing conditions, diseases, or medications identified in the guideline (https://my.nof.org/bone-source/education/clinicians-guide-to-the-prevention-and-treatment-of-osteoporosis). A dual-energy X-ray absorptiometry (DXA) to measure bone mineral density (BMD) is indicated as a baseline screening measure.[5] A BMD-defined T-score alone of less than or equal to −2.5 calculated at the lumbar spine, femoral neck, or hip is a threshold for treatment and diagnosis.[12,14] However, it is important to note additional screening and treatment of osteoporosis should not be withheld on the basis of T-score alone because DXA measurements assess the density of bone, not the quality nor strength of bone.[15]

The use of tools, such as the FRAX and QFracture, or other validated screening tools integrate secondary clinical risk factors into the risk screening, providing a more comprehensive assessment of osteoporosis and fragility fracture risk.[16] A FRAX derived 10-year hip fracture risk estimate of ≥3% or a major osteoporotic fracture (hip, spine, shoulder, forearm) risk of ≥20% and/or history of a hip or spine fracture supports the diagnosis of osteoporosis.[14]

Screening begins with the PCP. Upon noting clinical risk factors for osteoporosis/osteopenia, a referral is warranted to a fracture liaison service (FLS). Nurse practitioners or physician assistants are typically the bone health specialists who manage FLS practices.[1] The use of a FLS has been shown to decrease morbidity, mortality, and costs associated with poor bone health.[1,10]

Management of Osteoporosis and Osteopenia

The greatest impact on osteoporosis investigation, treatment initiation, and treatment adherence occurs when dedicated personnel are available to aid in the implementation process, which improves osteoporotic fragility fracture outcomes,[8,10,17] including fewer secondary fractures, increased quality of life years, and more cost-effective care.[1,10] In 2016, the National Quality Forum endorsed 2 Joint Commission measures monitoring percentages of patients with fracture risk assessment, laboratory investigation, and treatment plan initiation. Contact with a bone health specialist or an FLS will ensure fulfillment of both measures.[18] Referring patients who have suffered a fragility fracture or are at risk of a fragility fracture to an FLS for evaluation and management provides the patient the best opportunity to receive optimal care and outcomes, much like referring patients who have suffered a myocardial infarction to a cardiology specialist for management of patient care.

Universal Recommendations

Regular weight-bearing exercise is important for maintaining bone health. Physical activity aids in balance, strength, and posture and has been shown to reduce fracture risk as well as decreasing falls.[5,19-22] Patient education regarding BMD and fracture risk should be completed before advising patients to partake in higher impact weight-bearing physical activities, such as running and heavy weightlifting. Care should be taken in patients with bone loss to maintain a neutral position of the spine and avoid activities that involve bending, lifting, and twisting because this has been shown to induce vertebral body compression fractures.[23]

Pharmacological Management

As the management of osteoporosis is moving toward a subspecialty approach, it is important both the provider treating the patient with osteoporosis and the PCP are informed about expected patient outcomes related to the prescribed pharmacological treatment. Equally important is knowledge regarding the safety profile of these medications, because patients commonly cite fear of side effects as the reason not to receive treatment. There are advantages and disadvantages to each medication and the treatment decision is individualized based on each patient's health history.

Calcium and Vitamin D. Many recommendations have been made for patients of all ages regardless of BMD results to help maintain and preserve bone. Nutritional interventions such as adequate calcium and vitamin D supplementation are of paramount importance. Reviewing dietary intake of calcium is an important aspect of the comprehensive health history when meeting with patients. Evidence shows the importance of appropriate calcium and vitamin D intake throughout the lifetime and the role in fracture risk reduction[5,24]. The Institute of Medicine (IOM) as well as NOF support a daily calcium intake in men age 50–70 of 1,000 mg per day. In women aged 51 and older and in men aged 71 and older, a daily intake of 1,200 mg per day of calcium intake is recommended.[5,25] The NOF recommends 800–1000 International Units of daily vitamin D in both men and women over age 50. However, certain patients require more vitamin D intake, and dosing should be individualized based on health history and laboratory monitoring. All patients are screened for baseline calcium and vitamin D levels before initiation of treatment, at the initial follow-up visit post start of therapy, and yearly thereafter. Deficiencies or excesses are treated on an as-needed basis[5].

Bisphosphonates. Oral bisphosphonates (Fosamax, Actonel, Boniva) are good agents to give as a first-line therapy to decrease bone breakdown.[26] Bisphosphonates decrease osteoclastic activity thereby decreasing bone loss and fractures. The most improvement in BMD is seen in the first 3–5 years following initiation; however, the duration of treatment with bisphosphonate medications ranges from 3 to 10 years depending on severity of disease, patient risk profile, and expert opinion.[12]

Patient adherence with dosing factors into treatment effectiveness. Bisphosphonates should be taken first thing in the morning before anything is taken by mouth with 8 ounces of water. An additional 2 ounces of water should be taken after the initial 8 ounces to promote gastric emptying and prevent esophageal irritation. Patients should remain upright for at least 30 minutes after dosing and until after their first food intake for the day. Patients should not eat or drink for 30 minutes after dosing.[27,28]

Oral bisphosphonates are contraindicated in patients with decreased kidney function determined by creatinine clearance and glomerular filtration rate. Bisphosphonates can cause hypocalcemia and gastrointestinal distress including dysphagia and inflammation of the upper gastrointestinal tract.[12] Patients who have had gastric bypass surgery should not be prescribed oral bisphosphonates due to the less than 1% bioavailability of these medications. Bisphosphonates should not be prescribed to any patient with a history of esophageal disorders, such as gastroesophageal reflux disease and Barrett's esophagus.[27,28] Rare occurrence of osteonecrosis of the jaw (ONJ) and low trauma atypical fracture of the femur (AFF) have been reported.[12]

Zolendronic acid is an intravenous bisphosphonate given to higher risk patients or patients who are unable to take oral bisphosphonates. The level of risk assigned to patients is determined by the care provider based on numerous factors, including FRAX score, fall risk and history, fracture history, and comorbidities. Zolendronic acid carries the same contraindication related to renal function as the oral bisphosphonates.[12]

Anit-RANKL. Denosumab (Prolia) is given subcutaneously every 6 months.[29] Denosumab prevents bone breakdown by blocking osteoclastic activity. Severe osteoclastic rebound effect is seen with abrupt cessation of the medication leading to subsequent increase in vertebral compression fracture risk.[12] The rebound increase in bone resorption rate lasts for 24 months after cessation of therapy. Denosumab is given to patients at higher risk of fracture or in patients who cannot take or tolerate bisphosphonates.[29] Hypocalcemia is seen in patients taking denosumab. Rarely, ONJ and AFF may occur.[12] Musculoskeletal pain, hypercholesterolemia, and cystitis have been identified as side effects.[29]

Selective Estrogen Receptor Modulator. Relofexine (Evista) is a selective estrogen receptor modulator (SERM) medication taken by mouth. Relofexine also inhibits osteoclastic activity, which results in decreased bone resorption. SERMs are indicated in postmenopausal women. SERMs decrease bone breakdown and reduce spinal fracture risk. Side effects include hot flashes, leg cramps, and rarely blood clots. The incidence of thrombus formation is similar to the incidence of the same in patients receiving estrogen replacement therapy. If a patient is receiving a SERM for non–bone-health-associated reasons, an alternative bone health pharmacological agent should be added to the pharmacological regimen.[12]

Anabolic Agents. Abaloparatide (Tymlos) and teriparatide (Forteo) are forms of human parathyroid hormone given to patients at higher risk of fracture. The anabolic agents stimulate osteoblastic activity inducing bone growth. Abaloparatide and teriparatide are self-administered subcutaneously daily for a maximum of 2 years.[30,31] The side effects of abaloparatide and teriparatide include orthostatic hypotension, hypercalcemia, hypercalciuria, kidney stones, fatigue, palpitations, dizziness, nausea, upper abdominal pain (abaloparatide), joint pain (teriparatide) and headache.[30,31] Osteosarcoma was seen in high-dose rat clinical trials for both abaloparatide and teriparatide. Therefore, neither drug is recommended in patients with an increased risk of osteosarcoma including those with a current or history of bone malignancy either primary or metastatic, Paget's disease, or hypercalcemia. Current or past history of high-beam radiation is considered a contraindication to treatment with such medications.[12,30,31]

Sclerostin Inhibitor. Romosozumab (Evenity) was approved by the US Food and Drug Administration (FDA) in April 2019 and is indicated in higher risk individuals. The drug is administered in 2 consecutive subcutaneous injections administered by a health care provider once monthly for 12 consecutive months. Romosozumab stimulates bone formation and to a lesser degree decreases bone resorption. Romosozumab carries a box warning prohibiting administration in patients who have had a myocardial infarction or stroke within the preceding year. Headache, arthralgia and hypocalcemia are known side effects of romosozumab. ONJ and AFF have been reported as well.[32]

Rare Side Effects of Antiresorptive Medications. Patients are fearful of the rare side effects, particularly ONJ and AFF, and will likely consult with their PCPs regarding safety after being placed on one of the medications. Therefore, understanding of these rare adverse effects is important in enabling PCPs to better counsel patients when presented with this situation.

Osteonecrosis of the jaw. ONJ is a condition that can happen in patients who have dental implants and/or extractions, causing delayed healing or failure to heal of the exposed bone in the jaw. ONJ does not occur with most routine dental procedures including dental cleanings or cavity treatment. The rate of occurrence is 1 in 10,000 to 100,000.[33] This is not to be confused with other, more common causes of jaw pain, including temporomandibular joint dysfunction.

Atypical femur fracture. AFFs are fractures occurring in the subtrochanteric region of the femur after little or no trauma. AFFs have a prodromal period of groin or thigh pain.[12] In rare instances, AFF has been seen in patients receiving some of these medications. The occurrence rate ranges from 1 in 10,000 to 1 in 100,000.[33] If patients receiving these medications have a sudden onset of groin or thigh pain, additional work-up is necessary to rule out AFF.

Together, ONJ and AFF are rare. The occurrence of a sentinel fracture accompanied by inherent morbidity and mortality in a patient with untreated osteoporosis is a substantially higher risk than ONJ or AFF.[33] Statistically speaking, a patient is at a higher risk of death by murder or motor vehicle accident[34] than the occurrence of ONJ and AFF from osteoporosis therapies, and therefore treatment benefits outweigh risks in patients with appropriate work-up.[33]

Osteosarcoma. Teriparatide was approved by the FDA in 2002. Osteosarcoma has not been demonstrated to be associated with teriparatide use in humans,[35,36] Based on dose and duration data from rat studies, the occurrence of the neoplasms in rats is not predictive of neoplasm in humans. Rats were dosed 18 times the human dose. The dosing length for rats was 70% of their life span, and in human adults it is dosed for 2–3% of the life span.[37] Additionally, no studies in monkeys have been able to induce bone neoplasm with teriparatide use.[38]

Conclusion

Screening, diagnosing, and treating osteoporosis are multifaceted endeavors. The population of at-risk individuals is far more widespread than postmenopausal women and men over age 70. Understanding the risk factors will lead to improved screening and preventative services. In recent years, many pharmaceutical agents have been approved for treating osteoporosis giving health care providers the ability to tailor treatment to achieve the best outcomes for affected patients. Primary care providers are essential in winning the battle against bone loss and fragility fractures. Once an at-risk individual is identified, best practice is to refer the patient to an FLS for care. While a patient is receiving care for low bone density, the PCP accentuates treatment by monitoring general health and well-being, reinforcing osteoporosis education and treatment plan, and serving as an additional point of contact for any osteoporosis treatment plan questions or concerns.

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